SELECTING THE MOST SUITABLE CLASSIFICATION ALGORITHM FOR SUPPORTING ASSISTIVE TECHNOLOGY ADOPTION FOR PEOPLE WITH DEMENTIA: A MULTICRITERIA FRAMEWORK

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Abstract

The number of people with dementia (PwD) is increasing dramatically. PwD exhibit impairments of reasoning, memory, and thought that require some form of self-management intervention to support the completion of everyday activities while maintaining a level of independence. To address this need, efforts have been directed to the development of assistive technology solutions, which may provide an opportunity to alleviate the burden faced by the PwD and their carers. Nevertheless, uptake of such solutions has been limited. It is therefore necessary to use classifiers to discriminate between adopters and nonadopters of these technologies in order to avoid cost overruns and potential negative effects on quality of life. As multiple classification algorithms have been developed, choosing the most suitable classifier has become a critical step in technology adoption. To select the most appropriate classifier, a set of criteria from various domains need to be taken into account by decision makers. In addition, it is crucial to define the most appropriate multicriteria decision-making approach for the modelling of technology adoption. Considering the above-mentioned aspects, this paper presents the integration of a five-phase methodology based on the Fuzzy Analytic Hierarchy Process and the Technique for Order of Preference by Similarity to Ideal Solution to determine the most suitable classifier for supporting assistive technology adoption studies. Fuzzy Analytic Hierarchy Process is used to determine the relative weights of criteria and subcriteria under uncertainty and Technique for Order of Preference by Similarity to Ideal Solution is applied to rank the classifier alternatives. A case study considering a mobile-based self-management and reminding solution for PwD is described to validate the proposed approach. The results revealed that the best classifier was k-nearest-neighbour with a closeness coefficient of 0.804, and the most important criterion when selecting classifiers is scalability. The paper also discusses the strengths and weaknesses of each algorithm that should be addressed in future research.

Keywords

Assistive technology, Classifier, Dementia, FAHP, TOPSIS